

SEP 18 1928

SCIENCE

NEW SERIES
VOL. LXVIII, No. 1759

FRIDAY, SEPTEMBER 14, 1928

ANNUAL SUBSCRIPTION, \$6.00
SINGLE COPIES, 15 CTS.

P. BLAKISTON'S SON & CO.

Publishers

1012 Walnut Street

Philadelphia

PITTENGER—Biologic Assays

2d Edition. 153 Illustrations. 54 New Figures. 8 Tables. Cloth, \$3.00

By PAUL S. PITTENGER, PHAR.D., Instructor in Biologic Assaying, Philadelphia College of Pharmacy and Science, and Temple University School of Pharmacy

The book has been entirely rewritten to include many improvements, especially technical details insuring greater accuracy. New illustrations are given and new chapters added.

LEE—Microtomist's Vade Mecum

9th Edition. Illustrated. Cloth, \$7.50

A handbook of the methods of microscopic anatomy. Much new material is presented, the embryological, cytological, protozoological and entomological sections especially being enlarged.

Editors: J. Bronte Gatenby, D.Sc., Prof. of Zoology and Comparative Anatomy, Dublin University, and E. V. Cowdry, Ph.D., Rockefeller Institute for Medical Research, New York.

Contributors: W. R. G. Atkins, Sc.D. (Eng.), J. Thornton Carter (Eng.), Robert Chambers, Ph.D. (N. Y.), W. Cramer, Sc.D. (Eng.), Dr. C. Da Fano (Eng.), Helen Pixell-Goodrich, Sc.D. (Eng.), J. G. Greenfield, M.D. (Eng.), Reginald Ludford, D.Sc. (Eng.), G. Paylind Wright, B.Ch. (Eng.), F. W. Rogers Bramwell, Sc.D. (Eng.).

AUTENREITH—WARREN—Detection of Poisons and Powerful Drugs

6th Edition. Based on 5th German Edition but Completely Revised with Extensive Additions. Colored Plate and 60 Text Illustrations. Cloth, \$6.00

By DR. W. AUTENREITH (Freiburg), Authorized Translation by WM. H. WARREN, PH.D., Professor of Organic Chemistry, Clark University

This is a thorough and modern laboratory guide. Many new substances and methods have been included, together with apparatus, special methods, appendix of investigations in detail, etc.

MORRIS—Textbook of Human Anatomy

8th Edition. Revised, Improved. 1164 Illustrations, 515 in Colors. Cloth, \$10.00

A complete systematic treatise prepared by a number of collaborators and edited by C. M. Jackson, Professor and Director, Department of Anatomy, University of Minnesota.

FOX—Insects and Disease of Man

92 Illustrations. Cloth, \$4.00

By CARROLL FOX, M.D., Surgeon, Public Health Service

It describes the Arthropods that carry infections, giving points of identification, preventive measures, diseases transmitted, etc.

**Recent Papers
On Varied Subjects—**

ADOLF PABST

**Observations on Inclusions in the
Granite Rocks of the Sierra Nevada**

Illustrated, 75 cents

O. L. HUDDLESTON

**Contribution to the Study of Function
of the Sacculus Otolith of the Frog**

Illustrated, 25 cents

HAROLD JONES

Assisted by HERBERT CONRAD
and AARON HORN

**Psychological Studies of Motion Pic-
tures. II. Observation and Recall
as a Function of Age**

Illustrated, 25 cents

List of some 2000 titles
sent free on request

University of California Press

Berkeley, California

**New Publications of
THE PHILIPPINE
BUREAU OF SCIENCE**

**RECENT MADREPORARIA OF THE
PHILIPPINE ISLANDS.** By Leopoldo A.
Faustino. 310 pages and 100 plates; post-
paid, \$2.50.

**GOBIES OF THE PHILIPPINES AND
THE CHINA SEA.** By Albert W. Herre.
352 pages, 30 plates, and 6 text figures; post-
paid, \$2.50.

**THE PHILIPPINE JOURNAL OF SCI-
ENCE**, a monthly, issued in three volumes a
year; per year, \$5.00.

A list of the publications of the Philippine
Bureau of Science and a sample copy of the
Philippine Journal of Science will be sent upon
request.

*Subscriptions and orders for publication should
be sent to*

THE BUSINESS MANAGER

Philippine Journal of Science

Bureau of Science

Manila, P. I.

The Wistar Institute Bibliographic Service

is of invaluable assistance to

Librarians—Investigators—Teachers

It brings to them, in **AUTHORS' ABSTRACT** form, a brief
review of all original papers on Biological Subjects which
appear in the following journals:

Journal of Morphology and Physiology
The Journal of Comparative Neurology
The American Journal of Anatomy
The Anatomical Record
The Journal of Experimental Zoology
American Journal of Physical Anthropology
The American Anatomical Memoirs
The Biological Bulletin (M. B. L., Woods Hole, Mass.)
Folia Anatomica Japonica (Tokio, Japan)
The Journal of Parasitology (Urbana, Ill.)
**The Australian Journal of Experimental Biology
and Medical Science (Adelaide, South Australia)**
Stain Technology (Geneva, N. Y.)
Physiological Zoology (Chicago, Ill.)

Advance Abstract Sheets

issued every few days, bearing Authors' Abstracts without
bibliographic references, offer a practical means of making
research immediately available in abstract form and of pur-
chasing articles of special interest in reprint form without
the necessity of subscribing to all the journals. Subscrip-
tion, \$3.00 per year.

Bibliographic Service Cards

with complete bibliographic references, printed on Standard
Library-catalogue cards, are of value and assistance to Li-
brarians and Investigators. Subscription, \$5.00 per year.

Abstracts in Book Form

referred to above, are brought together periodically, with
Authors' and Analytical Subject Indices. Price \$5.00 per
volume.

*Subscriptions to the Bibliographic Service
and orders for reprints should be sent to*

The Wistar Institute of Anatomy and Biology
Thirty-sixth St. and Woodland Ave. Philadelphia, Pa.

THE MONIST

Contents

October, 1928

Relativity in Logic	PAUL WEISS
Can Psychology Contrib- ute to the Study of Linguistics?	J. R. KANTOR
A Personalistic Concep- tion of Nature	A. K. MAJUMDAR
Egoism	CHARLES M. ATTLEE
A Critique on the Found- ation of Adler's Ethic- al Philosophy	JOSEPH RATNER
The Search for Certainty	L. P. CHAMBERS
Neo-pragmatism and the Ways of Knowing	CHARLES W. MORRIS
The Idea of God in a Philosophy of Events	WILLIAM F. CLARKE
Dewey's Theory on the Moral Good	PAUL CRISSMAN
Some Recent Books	

\$3.00 yearly; 85c an issue.

The Open Court Publishing Company

339 East Chicago Avenue,
Chicago, Illinois.

SCIENCE

VOL. LXVIII

SEPTEMBER 14, 1928

No. 1759

CONTENTS

<i>The Fourth International Congress of Entomology:</i> PROFESSOR GLENN W. HERRICK	237
<i>Strategical Periods for the Encouragement of Research Students:</i> PROFESSOR S. R. WILLIAMS	244
<i>Scientific Events:</i>	
<i>The Faculty of Medicine of the University of Lyons; Investigation of the Great Barrier Reef; The Forest Products Laboratory of the Forest Service; The Graduate School of the U. S. Department of Agriculture; The Conference on Bituminous Coal</i>	245
<i>Scientific Notes and News</i>	248
<i>University and Educational Notes</i>	251
<i>Discussion:</i>	
<i>The Earliest Dynamo: ELIHU THOMSON. Early Gramme Machines: DR. H. W. WILEY. The Proposed National Park in the Mammoth Cave Region: A. C. SWINNERTON</i>	251
<i>Quotations:</i>	
<i>Chemistry in Industry</i>	254
<i>Scientific Books:</i>	
<i>Baulig on Le Plateau Central de la France: PROFESSOR W. M. DAVIS</i>	253
<i>Special Articles:</i>	
<i>The Effect of Cod Liver Oil on the Delayed Coagulation Time: DR. JOHN C. BROUGH. Citric Acid Inversion of Sucrose in Plant Tissues: J. E. WEBSTER and C. DALBOM. The Mutant Paramecium aurelia: DR. J. A. DAWSON</i>	256
<i>Science News</i>	x

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal.
Lancaster, Pa. Garrison, N. Y.
Annual Subscription, \$6.00. Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

THE FOURTH INTERNATIONAL CONGRESS OF ENTOMOLOGY

THE First International Congress of Entomology was held in Brussels in 1910, the second congress was held at Oxford in 1912, the third, after a long interval covering the period of the world war, at Zurich in 1925, while the fourth congress just held in Ithaca, at Cornell University, from August 12-18, has also become a matter of history so far as the actual events which took place during that week are concerned.

In point of numbers, the fourth congress was the largest one ever held, a statement dear to the heart of most Americans. The total number registering was 625, among which were representatives of 39 countries. Thus the prophecy made by the writer in the June number of *The Scientific Monthly* has been fulfilled. As we there predicted, large numbers of American and Canadian entomologists came to the congress, while the funds provided by the Carnegie Endowment for International Peace, together with the desire of European entomologists to visit America, brought a surprisingly large number of foreign guests to Ithaca. It was the presence of these latter members that made the congress a truly international one. We believe moreover that this opportunity for the coworkers of different nationalities to become acquainted with each other has contributed much toward more friendly intercourse among the scientists of the various countries represented, and that it will certainly exert its influence toward a more mutual respect between the peoples of the different nations involved. The writer is told by those who have attended the former congresses that in point of enthusiasm and quality of papers read, the fourth congress will compare favorably with any of those held before.

The first contingent of foreign entomologists, headed by Dr. Karl Jordan, secretary of the permanent executive committee, arrived in Ithaca on Saturday, August 11. These delegates, about thirty in number, reached New York on Monday, August 6, where, during the intervening time they were entertained and shown the features of scientific interest in the city by the entomological societies of New York and Brooklyn. Early on Sunday morning, August 12, a second group of Europeans arrived and the activities of the congress began in earnest, as two excursions for those interested in collecting had been arranged to take place on Sunday and several of the visitors after registering took advantage of them and spent a large part of the

day in their favorite recreation of hunting representatives of the special group of insects in which each was interested. Here, in America, these foreign entomologists were sure to find species new to them, a feature which gave great zest to their excursions in the field. In the afternoon the women of the local department of entomology served tea to all of the visiting guests. By this time many American entomologists had arrived, and, taking their cue from the foreigners, entered into the spirit of the tea party and drank as enthusiastically of the harmless beverage as though they had been going to teas every day of their lives. Indeed, the teas given during the afternoons of the week proved to be the most delightful social occasions of the congress. Every one not on a belated collecting excursion came to them and found opportunity in the numerous parlors and on the terraces of Willard Straight Memorial Hall to meet and to become acquainted with each other. It was at the teas that we came to know the foreign entomologists with whom we had perhaps corresponded and with whom we had at one time or another chanced to exchange specimens. In the evening of Sunday an informal gathering was held in Willard Straight Hall and here again we had a further opportunity of becoming acquainted before the more serious work of the congress began the following morning.

MEETING PLACES AND FACILITIES

The headquarters and place of registration were located in Willard Straight Memorial Hall, the social center of the students of the university when it is in session. Willard Straight proved to be almost an ideal building for the purpose. The large lobby furnished ample room for the desks for registration, information, *et al.*, while the large spacious lounging hall adjoining, the library at the left and the three attractive parlors beyond afforded convenient facilities for all social events. In these halls and parlors one could find an easy chair in which to take an afternoon siesta, or a table around which a party could gather to smoke and talk shop or discuss politics, while the attractive parlors gave space for the afternoon teas. The two large stone terraces on the western side of the building overlooking the city, valley, hills and lake proved popular gathering places, especially since the congress was favored with fine, fair weather during the whole week. Perhaps, the most appreciated facilities of Willard Straight were the large cafeteria and the several dining halls and restaurants on the floor below the registration hall. Here in these eating halls, all the visitors were easily accommodated for any or all of their meals at reasonable prices. In addition, one large dining-room was available for the special dinners of different groups.

The meetings for the reading of papers and discussions were held mainly in the Baker Laboratory of Chemistry with an overflow of two sections into the Rockefeller Hall of Physics just across the way. Baker Hall with its main assembly room in which the general sessions were held and its numerous lecture rooms with lanterns proved convenient for bringing the meetings into a compact area.

Another feature which many of the automobilists seemed to enjoy was the fine camping ground on the hilltop behind and beneath the stadium. There one could spread his tent beneath the stadium seats and be dry no matter how hard it rained, or the tent could be set on the greensward behind the stadium, a proceeding which proved to be without danger of the discomfort of getting wet. By taking a few steps in the morning up the stadium seats, one could get a fine view of the valley, hills and lake to the west, north and south, which ought to have put him in a fine fettle for breakfast.

THE OPENING OF THE CONGRESS

On Monday morning the congress opened with a general session in Bailey Hall. By this time over five hundred visiting entomologists had registered who, together with their wives and the local visitors, formed an impressive gathering. Brief and happy addresses of welcome were given by Dean W. A. Hammond, of the university faculty, and Dean A. R. Mann, of the New York State College of Agriculture. These were followed by the address of the president of the congress, Dr. L. O. Howard, who presided in his ever happy and delightful manner. In his address, Dr. Howard stressed the importance of entomology in the economy of human activities and urged that more time be given in the courses of zoology in the universities of this country to the teaching of entomology. He gave a fine tribute to Professor John Henry Comstock, who began the teaching of entomology at Cornell as a distinct subject in 1871 and who developed it to its appropriate rank among other zoological subjects through his continuous labors extending over a period of more than forty years. The address of Dr. Howard appears in full in *SCIENCE* in the issue of August 17, 1928. Following the address of the president, three papers were read by Dr. René G. Jeannel, of France; Dr. Karl Jordan, of England, and Dr. Ivar Trägårdh, of Sweden. Dr. Jordan then gave a brief report as secretary of the permanent executive committee thus bringing to a close the first session of this memorable congress.

SESSIONS OF THE CONGRESS

Four general sessions were held during the mornings at which papers dealing with the broader aspects of entomology were read by representative men from

foreign countries and from America. During the afternoons the sections on the various divisions of the science held their sessions. In general, four or five papers were scheduled for each of these afternoon sessions. Each speaker had been invited to read a paper of not more than twenty minutes in length which left at least ten minutes for informal discussion. Thus the four or five papers were supposed to occupy from two to two and one half hours and the sessions approximated this period very closely. As each afternoon session began at two o'clock it was over by 4:30 thus giving every one an opportunity to return to Willard Straight Hall for tea and social visiting.

The sessions and sections were as follows:

Monday, August 13

The general morning session held from 9:00 to 12:00 included, in addition to the addresses of welcome and the address of the president, three papers read by Dr. René B. Jeannel, Dr. Karl Jordan, and Dr. Ivar Trägårdh, respectively.

The afternoon sections from 2:00 to 4:30 were as follows: (1) Nomenclature and Bibliography; (2) Ecology; (3) Medical and Veterinary Entomology; (4) Economic Entomology; (5) Apiculture.

Tuesday, August 14

At the general session held from 9:00 to 12:00, five papers were read by Professor E. L. Bouvier, of Paris, France; Dr. Erich Martini, of Hamburg, Germany; Dr. Walther Horn, of Berlin-Dahlem, Germany; Dr. Filippo Silvestri, of Portici, Italy, and Dr. William Morton Wheeler, of Boston, Massachusetts, respectively.

The afternoon sections from 2:00 to 4:30 were as follows: (1) Systematic Entomology and Zoogeography; (2) Nomenclature and Bibliography; (3) Morphology, Physiology, Embryology and Genetics; (4) Medical and Veterinary Entomology; (5) Forest Entomology; (6) Economic Entomology; (7) Apiculture.

Wednesday, August 15

On Wednesday, the congress in a body, made a hegira to the New York Agricultural Experiment Station at Geneva, New York, where the sections on systematic entomology and zoogeography, and economic entomology had their meetings in the afternoon, but no general session was held. Instead, during the forenoon, the New York State Horticultural Society with its hundreds of progressive fruit growers held its meeting, at which Mr. Thomas B. Byrd, of Virginia, gave the principal address. This meeting of the Horticultural Society gave the visiting foreign entomologists an opportunity to see a representative body of fruit-growers and farmers of America. In addition, the U. S. Department of Agriculture, under the direction of L. H. Worthley and R. B. Gray, gave a fine demonstration of the measures in operation for the control of the European corn borer. Burning, plowing, cutting, pulverizing, and all the various devices that have been perfected to combat the corn

borer were demonstrated. The equipment included a specially devised low-cutting corn binder, a low-cutting ensilage harvester, a stubble pulverizer, a stalk shaver and side delivery rake used with the shaver, and special plows for turning under stubble and refuse. A burner used in ridding corn fields of the borer was also demonstrated.

Other features were exhibits of improved models of dust and spray machines, screened doors designed to kill stable and house-flies by contact with an electrical current, the fungicidal and insecticidal properties of sulfur, sulphide sulfur and colloidal sulfur, wax models and photographic enlargements showing the more important destructive insects and nature of injuries to the principal agricultural crops of the state.

As a whole, the day at Geneva proved to be a very interesting and profitable one, and many of the guests expressed their enthusiasm over the visit. All returned to Ithaca the same evening.

Thursday, August 16

At the general session held from 9:00 to 12:00, papers were read by Dr. W. J. Holland, of Pittsburgh, Penn.; Professor M. N. Rimsky-Korsakov, of Leningrad, Russia; Dr. Hassan C. Efflatoun Bey, of Gizeh, Egypt; Dr. E. P. Felt, of Stamford, Conn., and Dr. C. L. Marlatt, of Washington, D. C.

The afternoon sections from 2:00 to 4:30 were as follows: (1) Systematic Entomology and Zoogeography; (2) Morphology, Physiology, Embryology and Genetics; (3) Ecology; (4) Medical and Veterinary Entomology; (5) Economic Entomology; (6) Apiculture.

Friday, August 17

On Friday the events were reversed and the sectional meetings were held in the forenoon while the general session, followed with a short business meeting was held in the afternoon.

The sectional meetings in the morning were as follows: (1) Systematic Entomology and Zoogeography; (2) Morphology, Physiology, Embryology and Genetics; (3) Forest Entomology; (4) Economic Entomology; (5) Apiculture.

In the afternoon at the general session five papers were read by Professor J. B. Corporaal, Wageningen, The Netherlands; Dr. Franz Heikertinger, of Vienna, Austria; Dr. R. J. Tillyard, of Canberra, Australia; Dr. A. D. Imms, of Harpenden, Herts, England, and E. B. Poulton, Oxford, England (read by W. A. Riley).

Saturday, August 18

Saturday morning was given over to brief sessions for the presentation of certain papers on systematic entomology and zoogeography, for the reading of which there had not been time during previous sessions. In the afternoon an excursion was made to Watkins Glen.

SOME OF THE FOREIGN DELEGATES AND VISITORS

The congress was notable for the large number of foreign entomologists in attendance. For the first time, we American entomologists had an opportunity of meeting in a body our foreign confrères, of talking over with

them our mutual problems and of getting acquainted with them in a social way. It was a wholesome, delightful and memorable experience. The following partial list of foreign visitors is arranged by countries in alphabetical order.

Argentina: Hon. A. C. Bollini, New York.

Armenia: Professor V. S. Dakessian.

Australia: Dr. R. J. Tillyard, Canberra; Professor W. B. Gurney, Sydney.

Austria: Dr. F. Heikertinger, Vienna.

Belgium: Dr. A. d'Orchymont, Brussels; Dr. Antoine Ball, Brussels.

Bulgaria: Dr. P. Tschorbadjieff, Sofia.

Canada: Arthur Gibson, Ottawa; H. G. Crawford, Ottawa; Arthur Kelsall, Ottawa; K. M. King, Saskatoon; L. S. McLaine, Ottawa; W. A. Ross, Vineland Station, Ontario; Professor Georges Maheux, Quebec; Dr. W. H. Brittain, Quebec; Professor G. J. Spencer, Vancouver; Dr. Norma Ford, Toronto; Professor A. W. Baker, Guelph; E. Melville DuPorte, Quebec; S. Hadwen, Saskatoon; Dr. J. D. Detwiler, London.

Chile: Alberto Graf Marin, Santiago.

China: Dr. E. C. Faust, Peking; Chia Chi Wang.

Cuba: The Honorable Augusto Merchán, New York; Professor D. L. Van Dine, Central Baraguá.

Czechoslovakia: Dr. Francis Rambousek, Prague; Dr. Jaromir Šámal, Prague.

Denmark: Dr. Kai L. Henriksen, Copenhagen; Dr. Mathias Thomsen, Copenhagen; Dr. J. P. Kryger, Copenhagen.

England: Dr. J. C. F. Fryer, London; Dr. A. D. Imms, Harpenden, Herts; Professor L. E. S. Eastham, Cambridge; F. W. Edwards, London; N. D. Riley, London; W. H. Tams, London; Dr. James Waterston, London; G. Talbot, Witley, Surrey; Dr. Karl Jordan, Tring, Herts; Dr. Charles Hose, London; James E. Collin, London; G. Fox-Wilson, London; M. Cameron, London; L. B. Prout, Tring; O. W. Richards, London; Miss D. J. Jackson.

Egypt: Dr. Hassan C. Efflatoun Bey, Gizeh.

Finland: Dr. Uunio Salaas, Helsingfors; Dr. Niilo A. Vappula, Tikkurila.

France: Dr. Bernard Trouvelot, Paris; Dr. P. Vaysière, Paris; Dr. René G. Jeannel, Paris; Professor E. L. Bouvier, Paris; Dr. Robert Regnier, Rouen.

Germany: Dr. Martin Schwartz, Berlin; Fräulein Dr. Elisabeth Skwarra, Königsberg; Professor Dr. Baunacke, Dresden; Dr. F. Stellwaag, Neustadt Hdt.; Professor Dr. Max Dingler, Giessen; Dr. Walther Horn, Berlin-Dahlem; Dr. H. A. Eidmann, München; D. E. Martini, Hamburg.

Guatemala: Señor J. Montano Novella, New York.

Hungary: Dr. R. Streda, Budapest.

India: Y. P. Bhosale.

Ireland: Mr. John Carroll, Dublin.

¹ Technically the Canadians are placed among the foreign visitors. Actually they are quite as well known here and were quite as active hosts of the congress as the entomologists of the United States.

Italy: Dr. E. Gridelli, Genoa; Professor Filippo Sestri Portici.

Japan: Professor Shujiro Inomata, Tottori.

Mexico: Dr. Alfons Dampf, San Jacinto.

The Netherlands: The Honorable L. A. H. Petermann, Washington, D. C.; Professor W. Roepke, Wageningen; Dr. J. B. Corporaal, Wageningen.

New Zealand: Dr. E. Marsden, Wellington.

Norway: Professor Lief R. Natvig, Oslo.

Poland: Dr. R. Bledowski, Warsaw.

Roumania: Dr. W. Knechtel, Bucharest.

Russia: Professor Paul I. Adrianov, Moscow; Professor W. W. Alpatov, Moscow; Dr. E. Smirnov, Moscow; Dr. A. B. Martynov, Leningrad; Professor M. N. Rimsky-Korsakov, Leningrad; Professor N. N. Bogdanov, Katjkov, Leningrad; Dr. Iv. Nik. Filipjev, Leningrad.

Scotland: G. B. Bisset.

Spain: The Honorable Don Fernando Silvela, Washington, D. C.; Don Demetrio D. de Torres, Madrid; Don Jaime Nonell y Comas, Barcelona; Don Gonzalo Ceballos, Madrid; Dr. C. Bolivar Pieltain, Madrid.

Sweden: Dr. N. A. Kemner, Stockholm; Professor Ivar Trägårdh, Stockholm.

South Africa: Dr. F. W. Petter, Elsenberg; Professor S. H. Skaife, Capetown.

Venezuela: Hon. P. R. Rincones.

SOME INTERESTING PAPERS

As a whole, the program included an interesting and in some respects notable list of papers and with a very few exceptions each author was present to give his contribution. It seems rather invidious to pick out any particular papers for special mention when all were of such excellent quality. As is usual, however, among such a diversity of subjects discussed, some of the papers had a greater general appeal than others. For example, Dr. Karl Jordan's paper on "Problems of Distribution and Variation of North American Fleas" was of special interest to American entomologists. Dr. Jordan pointed out that there were 131 species of fleas known in America north of Mexico although almost no species are recorded from the Southern Atlantic and Mississippi states. He estimates the number of species in the United States and Canada to be well over 200 while in the world at large he says there are probably over 800.

Dr. C. L. Marlatt's paper on "Restrictions enforced by the United States on Entry of Foreign Plants and Plant Products for the Purpose of Excluding New and Dangerous Pests" was an excellent and conservative discussion of this rather disturbing question. It seemed to produce a good effect on the European visitors and to give them a broader sympathy with the viewpoint of this country.

Dr. Rimsky-Korsakov's paper on "Fresh Water-living Hymenopterous Parasites in Russia" was a most interesting discussion of these tiny insects and their

SEPTEMBER 14, 1928]

habits in frequenting the rather extraordinary medium of water in order to find their hosts. We usually think of all of the allies of the bees, wasps and ants as sun-loving and land-living forms.

The paper on "Termites Modify Building Codes," by Dr. T. E. Snyder, gave an impressive account of the enormous damage these insects often perform in the warmer portions of the United States and of the effective manner in which their ravages may be met by certain methods of construction recommended for use in erecting dwellings and other buildings.

"The Relation of Taxonomy to other Branches of Entomology," by Professor Filippo Silvestri, was an excellent discussion of the interdependence of one scientific observer upon another. He showed that a study of taxonomy was fundamental and underlies all real progress in other phases of the science.

"Arthropods in the Transmission of Tularaemia," by Edward Francis, of the Public Health Service, proved exceedingly interesting and enlightening. Tularaemia is much more prevalent in the United States than most of us imagined, while its source of contagion is to the layman unexpectedly common in rabbits.

Dr. René G. Jeannel gave an interesting discussion of the distribution of the small beetles in the subfamily *Trechinae* under the title "Le Peuplement de l'Amérique du Nord par les *Trechinae*." The history of this group of beetles in their distribution shows unmistakably an early land connection at the north between the continents of Asia and North America and an apparent connection at the south between Africa and South America.

Dr. W. M. Wheeler in his paper on "Two Interesting Neo-tropical Myrmecophytes (*Cordia alliodora* and *C. nodesa*)" pointed out the very interesting relations of ants and other insects to these plants. He showed conclusively that the domatia in these plants are preformed structures due to processes of plant growth and are not galls of insects. He concludes "that the usual plant myrmecophile theories which imply survival and the development of domatia through natural selection are simply 'bunk' and that 'the myrmecophytes have no more need of their ants than dogs have of their fleas.'"

Dr. Alfons Dampf, of Mexico, outlined the status of the "Fruit-fly Problem in Mexico." He described the serious injuries of the flies to different fruits of Mexico and gave an account of the collaboration between Mexico and the United States in the study and control of these pests.

In his paper on "Russia's Natural Life-zones and Their Injurious Insects," Professor I. N. Filipjev, of Leningrad, gave an interesting picture of the life-

zones of Russia, and the factors governing the delimitation of these zones together with the insect pests inhabiting them. The injurious insect fauna varies in a surprisingly clear manner in these different regions, the variation being due to differences in various factors, particularly climate, soil and the crops produced.

"Some Methods of Analyzing the Fauna of a Dying Tree," by Ivar Trägårdh, was most suggestive as to methods of arriving at some conclusion concerning the effects of insects in killing forest trees.

Dr. H. A. Eidmann also gave a most interesting paper on "Die Forstliche Bedeutung der Ameisen." He showed that certain ants play a most beneficial rôle in the forest by destroying great numbers of injurious insects. His statistical studies showed that about one half of the insects brought back by these ants, especially *Formica rufa* and its allies, were injurious to forest trees.

Dr. R. S. Tillyard's paper on "Biological Control of Noxious Weeds" gave a detailed account of his work in the control of the prickly pear in Australia by the utilization of insects which destroy this plant. He gave an account of the various kinds of insects which had proved effective in destroying the prickly pear. The problem confronting Dr. Tillyard was most difficult but the results of his work are very encouraging.

In a similar way Dr. A. D. Imms, of England, has been working on the control of certain noxious weeds in New Zealand. In his paper "The Biological Control of Noxious Plants," Dr. Imms pointed out the difficulties of importing foreign insects for the destruction of weeds. There is always the danger that the imported forms may attack cultivated crops also and thus become destructive as well as helpful. He indicated clearly the complexities of the problem, but, at the same time, showed the favorable possibilities of such work.

Papers by W. J. Baerg on "Some Poisonous Arthropods of North and Central America"; by James Waterston, of the British Museum on "The Preparation for Description and Preservation of Minute Hymenoptera"; by Armand d'Orchymont, of Brussels, on "Particulars of the Morphology and Geographical Distribution of American *Neohydrophilus*"; by Andreas B. Martynov, of Leningrad, on "The Permian Fossil Entomofauna of North Russia and its Relation to the Kansan"; by E. P. Felt, on "Insect Inhabitants of the Upper Air," and by Alfred Emerson on "Communication between Members of a Termite Colony" were of great scientific as well as of considerable popular interest.

Space does not permit of the mention of the large number of papers dealing with economic problems

connected with the insect pests of fruit, vegetable and cereal crops. In all, nearly 175 papers were presented to the congress, each one dealing with a topic of interest to the entomologist and many of them touching humanity in an intimate way because of the relation these tiny animals bear to the production of food and to the dissemination of human diseases.

EXCURSIONS, PICNICS AND LUNCHEONS

The region about Ithaca presents a great diversity of topography combined with marked variations in climatic features. It therefore provides a wide variety of flora and a consequent diversity of insect fauna. The wide variety of soil conditions, with fresh-water marshes, salt marshes, lake borders, marl springs, peat bogs, ravines, streams of different depths and velocities, upland hills, forest areas, old pastures and other topographical features combine to make of this region a unique collecting ground for all of the orders of insects. In addition, the region is particularly attractive because of its scenic beauty. Consequently a number of excursions were arranged for the visiting entomologists in order that they might collect and, at the same time, enjoy the natural beauties of the region. Every one of these jaunts was patronized from the very beginning and local friends were kind enough to furnish their cars so that all found transportation. The following places of interest were selected as points for collecting, sightseeing and picnics:

Enfield Glen: Each of the gorges of this region has its individuality and Enfield will be found different from any other, the deep, short, canyon at the upper entrance terminates in a waterfall 115 feet in height. From the base of the falls to the lower entrance, paths lead for about two miles through rich forest, affording excellent opportunities for collecting. The glen has become the retreat of several Arctic plants, surviving in the cool recesses since glacial times.

Taughannock Falls and Gorge: The western shore of Cayuga Lake gives no hint of the stupendous canyon of Taughannock. Here are no narrow defiles as at Enfield or Watkins, but the creek has carved for itself since glacial time an ample passage between sheer walls of solid rock that tower hundreds of feet above. At the head of this abyss the waters of Taughannock pour eternally over a leap greater than that of Niagara or any waterfall east of the Rocky Mountains, yet so unusual are the surrounding cliffs that the falls appear dwarfed when viewed from the rim. The gorge was an unconquerable stronghold of Taughannock, an Algonquin chief, who with his followers never gave allegiance to the Iroquois nations. The gorge offers unique opportunities for collecting, since

the south rim and cliffs harbor Arctic saxifrage and other northern species of plants.

The land surrounding the falls and gorge together with the large point projecting into Lake Cayuga have been purchased by the state and transformed into an attractive park. On Tuesday evening all members of the congress were transported to the park, where a picnic supper was served on the shores of the lake. During the visit a group of Onondaga Indians dressed in full Indian regalia appeared on the scene and gave several of their dances which were interspersed by an interesting talk on the American Indian by Dr. E. A. Bates, an authority on the lore and history of these original Americans.

Buttermilk Falls and Gorge: The stream flowing through this gorge abounds in remarkable pot holes and runs through narrow chasms culminating in Buttermilk Falls. On the upper courses of the stream are bottom lands and woodlands which afford excellent collecting grounds.

Watkins Glen: On Saturday afternoon, August 18, nearly all members of the congress made a visit to Watkins Glen. After a trip through the gorge, a basket lunch for supper was enjoyed by those who had come prepared. The others returned to Ithaca in time for supper. Watkins Glen is a noted post-glacial gorge and one of the most renowned beauty spots of the eastern United States. It was the site of the aboriginal fortifications of the Algonquin Indians, lying at the head of Seneca Lake. Its interest lies in its majestic scenery and geological formations but it is less important as a collecting ground for the entomologist than are some of the other glens.

Lloyd-Cornell Reservation at McLean: This is a tract of eighty-one acres donated by the late Curtis G. Lloyd, of Cincinnati, Ohio. It consists of sphagnum, peat and grass (marl) bogs with surrounding second-growth forest and pastured slopes, rimmed by an esker-like morainal ridge. The locality is a rich one for Trichoptera and other aquatic forms. Among butterflies peculiar to the bogs are: *Amblyscirtes samoset*, *Carterocephalus palaemon mandan*, *Pieris virginiensis*, *Heodes epixanthe*, *Feniseca tarquinius*, *Thecla augustus*, *Melitaea harrisii*, *Satyrodes canthus*, *Enodia portlandia*. The carabs, *Elaphrus olivaceus*, *E. Clairvillei* and *E. cicatricosus* also occur here.

Lloyd-Cornell Wild Flower Preserve: This is a tract of 420 acres of second growth hardwood forest, adjoining other extensive forested tracts of the hills near Ithaca, also donated by the late Mr. Lloyd as a wild flower preserve. The tract includes a rock-walled gorge in the upper valley of Six Mile Creek. Colonies of *Formica exsectoides*, the mound-building ant of the Allegheny Mountains made notable by the writings

of the late Dr. Henry C. McCook, are to be seen in the open forest of the hill-top.

Lloyd-Cornell Ringwood Wild Life Preserve: This reservation, also donated by Mr. Lloyd, lies seven miles east of Ithaca. It is a tract of 110 acres in the midst of a rolling wooded country at an average elevation of 1,600 feet. Kettle holes in the moraine afford ponds, one of which is spring-fed and permanent. To the east of the preserve is a sphagnum bog.

Lick Brook and Cayuga Lake Inlet: This region offers a varied environment, such as mud flats, gravel and sand banks, a long swiftly flowing stream, some pools of still water, cat-tail marshes, pastured bottom lands with open fields and groves, rank meadow vegetation, upland forest on hillsides and rocky gorge and stream.

Connecticut Hill and Cayuta Lake: A rolling upland region, the highest point being Connecticut Hill (2,100 feet) surrounded by lesser hills in an extensive area of abandoned farm lands. Forests of hardwoods, pines and hemlock struggle over the slopes and along the upland valleys. Representatives of the Canadian and Upper Austral zone floras mingle here. From Connecticut Hill, the land slopes steeply down to Cayuta Lake, about which deep swamps partly timbered offer still other variations in habitat.

Arnot Forest: This is a forest area of 1,850 acres recently donated by heirs of the late Mathias H. Arnot, for forest research to be conducted by the Department of Forestry of the New York State College of Agriculture.

The Sigma Delta Epsilon Luncheon for Women: On Thursday a luncheon was given at Willard Straight Hall in the large private dining-room by Sigma Delta Epsilon, Graduate Women's Scientific Fraternity. Covers were laid for sixty-three. Women from foreign countries and women actively engaged in entomological work were guests of the fraternity.

Following the luncheon some informal talks were given. Mrs. C. C. Murdock, president, spoke of the aims and purposes of the fraternity and then introduced Dr. Grace H. Griswold, who acted as toastmaster. Miss R. Louise Fitch, dean of women, spoke a few words of welcome. Mrs. Anna Botsford Comstock told from memory of the struggle carried on by Cornell in the early days to put the sciences on the same plane as the humanities. Mrs. E. E. Hose, of England, gave an interesting account of her work in bacteriology during the war, and then spoke briefly of some of her experiences in Borneo. Mrs. Uunio Salaas, of Finland, told of the interests and activities of the women of her country. Dr. Norma Ford, of Canada, gave some interesting facts concerning the University of Toronto which she represented as an

official delegate to the congress. Mrs. I. Trägårdh, of Sweden, gracefully expressed thanks to the American women for their kind hospitality.

The Luncheon for Foreign Women Visitors: A delightful luncheon was given on Tuesday by the local women of the university to the foreign women visitors. The luncheon was held at the Forest Home Inn in the attractive little village of Forest Home near the campus. Tables were set for twenty-eight, of whom fourteen were foreign women visitors.

TWO "HONORARY EVENTS"

Each of the previous congresses at some time during its meeting has been in the habit of conferring distinction upon certain eminent entomologists by electing them "Honorary members of the congresses." At the first congress held at Brussels in 1910, this distinction was conferred upon ten men, of whom one was an American, Samuel Hubbard Scudder, of Cambridge, Mass., since deceased. At the second congress three more honorary members were elected, while at the third congress additional individuals were thus honored, making a total of fourteen persons sharing this distinction. Of these, Professor John Henry Comstock, of Ithaca, is the only living American representative. It was, therefore, fitting that the fourth congress, meeting in America, should exercise its prerogative and follow the example of the previous congresses, which it did by electing two men, Dr. W. J. Holland, of Pittsburgh, Pa., and Dr. Stephen A. Forbes, of Urbana, Ill., "Honorary Members of the Congresses."

At the general session on Thursday morning this distinction was conferred upon Dr. W. J. Holland. The time of conferring the honor on Dr. Holland was particularly propitious because Thursday, August 16, was the occasion of his eightieth birthday. His broad work as a scientist, his specific contributions to the science of entomology, and his success in obtaining funds to pay the traveling expenses of visiting European entomologists make this honor a well-deserved one.

At the general session on Friday afternoon a like distinction was conferred by the congress on that veteran of American economic entomologists, Dr. Stephen A. Forbes. Dr. Forbes, now eighty-four years old, was a conspicuous and active member of the congress, but had been obliged to return home on Thursday and was not, therefore, present to receive the distinction in person. Dr. Forbes's contributions to the field of general and economic entomology, extending over a period of many years, marked him as a fitting recipient of this honor. His younger colleagues in the field of economic entomology feel particularly gratified by this mark of distinction.

THE BANQUET

The banquet, which was the concluding social event of the congress, was held on Friday evening, August 17, in the large hall of Willard Straight. The hall had been cleared of its lounging furniture, and tables with places for three hundred and fifty had been installed instead. Every place was taken and a few who waited too long before purchasing tickets were accommodated by some of the local people giving up their places.

Dr. Howard, in the capacity of toastmaster, called upon representatives from thirty-one countries, each of whom arose and spoke a few words in his native tongue. At least fifteen languages were spoken in the responses by the different members. In this respect the banquet was unique.

CONCLUSION

In conclusion it may be said with a reasonable degree of modesty that the congress was the most notable meeting of entomologists ever held in this country. It was truly an international gathering of the workers in the field of entomology and the spirit of good fellowship among the investigators in this science has been promoted and increased to a marked degree. The effects of the human contacts made during the week, of the intellectual stimulus produced by the exchange of ideas and of the renewed realization that investigators of other countries possess the same human sympathies, desires, wholesome ambitions and sincere devotion to truth as oneself, live on in the mind of every one of us and will continue to exert a widening influence toward a broader respect, tolerance and charity for each other's personality, work and aims.

Whenever the jingoes of this country talk of war hereafter, we shall remember the men we met and recalling that they were undoubtedly representative of their countrymen we shall be loath to be led into a quarrel with their country. Unquestionably every such international meeting of men from different countries, whereby they come to know each other as human beings, tends away from war and toward peace.

G. W. HERRICK

CORNELL UNIVERSITY

STRATEGICAL PERIODS FOR THE ENCOURAGEMENT OF RESEARCH STUDENTS

THE wise choice of a life work will insist on attention being paid to the personal joy of living which the vocation is expected to give. It is doubtful if any one is doing his best while trying to fill a profes-

sion in which he is unhappy. The day's work must bring a sense of joy in having contributed a little toward the ongoing of civilization. It is from this point of view that students may be enthusiastically advised to consider the fields of creative scholarship. The joy which comes from creative power was recognized very early in the history of man, for we read from a very ancient book that the Creator of all the universe contemplated his work and pronounced it good.

The advancement of knowledge requires that a fresh quota of research students should volunteer for service each year and in ever-increasing numbers. To make these students real service men they must enter the work with a sense of the joy in it all. Research students are the shock troops against ignorance. How many individuals be stimulated to join enthusiastically the ranks of those who advance knowledge?

It has been observed that out of a group of over sixty students who took up postgraduate work in physics, not over four of them had financial backing to go ahead with their graduate work. They had to depend upon assistantships in the universities where they wished to work for their Ph.D. That these assistantships have served admirably in promoting advanced work needs no argument.

However, many of these boys finished their college career in debt. It takes courage to plan graduate work with an old debt and possibly new ones staring one in the face. Couple with this assisting in a laboratory where large groups of non-inspiring students have to be dealt with and it must be evident to all that the conditions and environment for enthusing men to desire a life of creative scholarship are far from ideal.

If funds were available to finance a group of fellowships for this class of men, as has been done by the National Research Council for the men who have just taken their doctorate, I believe help in fostering research work would be applied at the most strategical period in the career of a young researcher. At present there are not enough graduate assistantships to take care of all those who desire to do graduate work. These additional fellowships would add greatly to the opportunities for advanced work which the assistantships now partially supply.

It would be most stimulating if every department in a college could offer to the best student majoring in that department a fellowship, of say \$600, to be used in some research center. This would make the first year in the graduate school much easier and give the recipient an opportunity for orienting himself for the following years.

The greater the number of students sent on for graduate work, the greater will be the number of better prepared and inspiring teachers to return to the colleges and universities to stimulate more research students. It will contribute both to our number of better teachers and to that increasing number of men who plan for research work in either pure or applied fields.

There is another group of students which deserves especial attention, *viz.*, those who, on completion of their college work, find themselves not quite prepared for graduate study. They are excellent students but, unwisely, have gone to a college whose curriculum is meager and inadequate. In this same class is the good student in the good college who finds his field of work late in his college course. This does not offer time to get the background essential for later specialization. For both of these groups, often financially embarrassed, there should be some sort of a continuation school. An attempt is made in a few departments of Amherst College to meet this difficulty by appointing such men as half-time laboratory assistants. These assistantships pay a definite stipend plus tuition. By taking two or three courses along with the assisting it becomes possible to patch the deficiency of preparation for graduate work.

These strategical periods in which help might be rendered fall within or immediately after the college days when students decide, for the most part, what they are going to do for a life work. Many wish to go on for a scholastic career but can't face the financial difficulties. They drift into business and thus are lost to the educational profession. Surely that occasion when men are debating what they should do for a profession is the strategical one in which to offer some financial relief. It is a period fraught with the greatest possibilities for developing the spirit of research in our country.

S. R. WILLIAMS

FAYERWEATHER LABORATORY OF PHYSICS,
AMHERST COLLEGE

SCIENTIFIC EVENTS

THE FACULTY OF MEDICINE OF THE UNIVERSITY OF LYONS

THE idea of the important reorganization of the Faculté de médecine de Lyon originated, according to the *Journal* of the American Medical Association, with Mr. Vincent, president of the Rockefeller Foundation. The city of Lyons was building a model hospital in the suburbs of Lyons, at Grange Blanche, which consisted of numerous separate pavilions, each of which comprised, in addition to wards for patients, a laboratory and a room for class instruction. Mr. Vin-

cent, visiting the building in process of construction, was struck with its unusually fine location and suggested that the faculté de médecine itself be located in the center of the group of hospitals. The dean of the faculty, Professor Jean Lepine, replied that that would require more funds than the city of Lyons could furnish. Mr. Vincent thereupon offered to supply 41,000,000 francs from the funds of the Rockefeller Foundation for the realization of the project, on condition that the remaining 15,000,000 francs be furnished by the government or the city of Lyons. M. Poincaré approved at once an appropriation of 12,000,000 francs and the city of Lyons voted the remaining 3,000,000 francs. The Rockefeller Foundation had previously given 800,000 francs to the Oeuvre franco-américaine de l'enfance and to the Hôpital d'enfants, which are directed by Madame Edmond Gillet. When completed, the new faculté de médecine, with the hospitals grouped about it, will occupy a considerable area. It will be equipped in the most modern manner, with numerous laboratories, lecture halls, elevators, a machinery hall and the like. This concentration will greatly facilitate the work of the students, who have heretofore been obliged to work in several hospitals scattered about the city, often great distances apart. They will have, furthermore, the advantage of being in continuous contact with their instructors. Since the new buildings will be situated some distance from the center of the city, dormitories for the students will be created near the faculté de médecine, constituting a small cité universitaire after the manner of the one now being constructed in Paris. The only objection seems to be that some professors will find trouble in looking after their clientèle.

INVESTIGATION OF THE GREAT BARRIER REEF

A PARTY of sixteen scientific men is reported in the *New York Times* to have recently arrived in Australia from Great Britain to study the problems of the Great Barrier Reef. For more than 1,200 miles along the eastern coast of tropical Australia, at an average distance from the shore of fifty miles, polyps have built a limestone rampart, to which they add every year thousands of tons of lime extracted from solution in the sea-water. How they do it is understood but imperfectly, and will form one of the most important of the investigations. Many other chemical and biological problems will engage their attention.

Dr. C. M. Yonge, leader of the expedition, has spent much time in research at the Plymouth Biological Station. The study of the biochemical changes accompanying the absorption and deposition of the limy substances of coral will be largely his work.

His wife, who is a qualified surgeon, accompanies him and will act as medical officer to the expedition. The expedition includes biologists, chemists, botanists, zoologists and geographers.

Dr. Yonge stated that:

Each member of the party is a specialist, and so the work done on the reef will be simply an extension of the investigations which have already been carried out in Britain. In addition to our inquiry into problems which have at the present only an academic interest, we intend to tackle several important economic problems, but our work will be very definitely limited by the means at our disposal.

Many species of edible fish abound in the channel between the reef and the shore, but for a full investigation of these from the commercial aspect a steam trawler would be necessary, so we do not hope for any striking results in that direction. The search for sponges of commercial value will be similarly limited. The culture of the pearl oyster and of the trochus shell, both very valuable articles in the world's trade, will probably yield good results, for we will be able to experiment with these during our thirteen months' stay on the reef.

Molluscs are comparatively easy to rear, and from my experience of the oyster beds on the French coast I believe that it should be possible to produce these in large quantities on several parts of the reef. We hope, too, to begin work on the migrations of the edible turtle and the hawk's-bill turtle, from which the valuable "tortoise-shell" of commerce is obtained. Until the wanderings of these animals are understood, it is hopeless to attempt to frame legislation to protect them by controlling the industry. The one thing certain is that promiscuous killing of them will ruin a valuable commercial asset.

The expedition will cost £10,000, of which £8,000 has already been subscribed by various scientific and other bodies, the Commonwealth of Australia and a number of private individuals. The chief purpose of the enterprise is research into the composition and formation of the coral reefs and their biology, and in order to examine the growth and feeding of the coral polyps in every season the expedition will continue work for more than a year.

THE FOREST PRODUCTS LABORATORY OF THE FOREST SERVICE

WITH one man in four of the technical staff in the field, the forest products laboratory of the Forest Service, U. S. Department of Agriculture, has carried on more investigations outside its own walls this summer than it has for some years past.

Twenty members of the staff have been detailed to studies in forests and sawmills from the Appalachian region to the Pacific Northwest. Some of the men were out for a few weeks only. Others have been away from the headquarters at Madison, Wis., for several months.

The increased amount of field work has been occasioned largely by the efforts being made to get fundamental lumber moisture data, and by the increasing tendency of laboratory studies to dovetail with management problems of the Forest Service on the national forests. The National Lumber Manufacturers' Association, through its trade extension organization, is cooperating with the laboratory in the moisture content study.

R. D. Garver, J. B. Cuno, Ray Miller and A. C. Wollin have been in North Carolina and Virginia for several months on an Appalachian logging and milling study similar to the studies already completed for the Lake States and Arkansas regions.

E. M. Davis, R. P. A. Johnson, G. C. Morbeck and F. E. Durfey are making observations on characteristic defects of western species in Montana, Idaho, Washington, Oregon and California.

Rolf Thelen, L. L. DeFlon, E. C. Peck, E. C. Rietz and O. W. Torgeson are obtaining information on the shipping moisture content of lumber at mills in California, the Inland Empire and the Pacific Northwest.

F. L. Browne is engaged in inspections of paint test fences in the southwest, in California, in the Pacific Northwest and at intermediate points.

A. O. Benson is in northern Wisconsin on a study of small dimension stock production.

W. K. Loughborough is making a survey of moisture content of lumber at southern pine mills for the Southern Pine Association. The objective of the association in this study is eventually to be able to make moisture content a part of specifications for each lumber grade.

R. F. Luxford has been in California for two months collecting redwood logs for mechanical tests.

J. D. MacLean is visiting western states from Montana to New Mexico to get information on the preservative treatment of Rocky Mountain tree species and Coast Douglas fir.

M. Y. Pillow is studying the occurrence of compression wood in western species in the California-Pacific Northwest-Inland Empire region.

R. M. Wirka is engaged in an inspection of treated crossties in service in Idaho, Utah, Wyoming, Nevada and Arizona.

THE GRADUATE SCHOOL OF THE U. S. DEPARTMENT OF AGRICULTURE

THE 1928-29 sessions of the graduate school of the Department of Agriculture will open with the week beginning October 15.

According to tentative plans, probably four graduate courses will be offered and conducted by the school if justified by demand. These courses are:

(1) Soil genesis, classification and erosion; (2) Plant genetics; (3) Plant physiology; (4) Instrumentation (second semester).

Under the auspices of the school, probably eleven undergraduate courses, carrying credit in most cases, will be conducted. These courses are:

(1) Principles and practices in agricultural cooperation; (2) Elementary statistical methods; (3) Advanced statistical methods; (4) Prices and price relationships; (5) Review of mathematics; (6) History of American agriculture; (7) Poultry husbandry (second semester); (8) Scientific French; (9) Intermediate scientific German; (10) Commercial Spanish; (11) Advanced Russian.

The course in soil genetics, classification and erosion, which will run through one semester, probably will begin on December 17 in order to give field men who come into Washington for the winter opportunity to take the course, and also one or two other courses may for the same reason start some time in December.

In connection with the school it frequently is possible for adequately prepared students to arrange to do special work on definite problems under supervision in the department's research laboratories. Such work and the credit to be granted should be arranged through the deans of accredited graduate schools. A limited number of such problems probably will be available this year.

The tuition is \$25 for two semesters of 30 hours each, or \$15 for one semester.

In a recently published statement regarding opportunities for education in Washington, the United States Civil Service Commission said the following:

In addition to the courses given by the universities and schools of special class, both the Bureau of Standards and the Department of Agriculture give a number of valuable courses in technical and professional lines which, as in the case of the school classes, are arranged at hours so that government employees may attend them. Graduate work in these departmental courses is accepted by a number of the standard universities as credit toward a higher degree.

THE CONFERENCE ON BITUMINOUS COAL

TWELVE major topics for discussion at the Second International Conference on Bituminous Coal, to be held under the auspices of the Carnegie Institute of Technology, Pittsburgh, Pa., from November 19 to 24, are tentatively announced by Dr. Thomas S. Baker, president of the institution and chairman of the congress. About one hundred engineers and scientific men representing fifteen nations have already tentatively accepted invitations to speak or to send papers, and the number of speakers and delegates is growing daily. About sixty per cent. of the papers will be

delivered by representatives of countries other than the United States.

Although the Second International Conference will be similar in purpose to the first congress held in 1926, preliminary plans for this year's meeting show that its scope will be considerably enlarged and the program will be more important and more international in character. The discussion of fixed nitrogen is one of the topics which will receive close attention. The liquefaction of coal, which was one of the principal subjects of discussion at the first meeting, will again occupy a prominent place in the deliberations. Low temperature distillation will be treated by representatives of at least a half dozen countries. High temperature distillation, power from coal, coal tars and oils, complete gasification of coal, origin of coal, coal washing, pulverized coal, catalysts and the general aspects of the bituminous coal industry are other topics that will be considered.

The subjects and speakers include:

The Economics of the Coal Industry: Lord Melchett, Dr. Friedrich Bergius, Professor Dr. Franz Fischer, Germany; André Kling and E. Audibert, France; Engineer Guardabassi, Italy; will deal with the subject of the liquefaction of coal.

Low Temperature Distillation: George E. K. Blythe, Dr. C. H. Lander, Harald Nielsen, Dr. E. W. Smith, England; Dr. A. Herz, Joseph Plassmann, Professor F. P. Kerschbaum, Germany; Henri Lafond, Professor Paul Lebeau, Antonie Vonk, A. Leante, France; Professor Dr. Granigg, Austria; Professor Yosikiyo Oshima, Japan; Professor Samuel W. Parr, Professor Alfred H. White and F. C. Greene, United States.

High Temperature Distillation: Jean Bing, France; Professor Ernest Terres, Germany; Edgar C. Evans, England.

Power from Coal: Dr. J. E. Noeggerath, Germany; C. Simon, France; A. T. Stuart, Canada; W. B. Chapman and Professor A. G. Christie, United States.

Coal Tars and Oils: Henri Winckler, France; Dr. L. Edeleanu and Professor Dr. Fritz Frank, Germany, and Gustaf Egloff, United States.

Gasification of Coal: Dr. Karl Bunte and Dr. Alfred Pott, Germany; Paul Weiss, France.

Origin of Coal: Professor George L. Stadnikoff, Russia; Dr. Chozo Iwasaki, Japan; Dr. Reinhardt Thiessen and Professor E. C. Jeffrey, United States.

Fixed Nitrogen: A representative of L'Air Liquide Société, France; Rudolf Battig, Germany; Professor Harry A. Curtis, Louis C. Jones and Charles J. Brand, United States.

Coal Washing: A. France, Belgium; Professor Dr. Glinz, Germany; Dr. R. Lessing, England; F. R. Wadleigh, Dr. F. W. Sperr, James B. Morrow and Byron Bird, United States.

Pulverized Coal: Dr. I. P. Goosens, Rudolph Pawlowski and Dr. P. Rosin, Germany; C. J. Jefferson, United States.

Catalysts: Professor A. Mailhe, France; Professor Hugh S. Taylor, United States.

Rubber from Coal: Professor Fritz Hoffmann, Germany.

Addresses not yet classified under these headings will be given, it is expected, by F. S. Sinnatt, England; Raymond Berr, France; P. E. Raaschou, Denmark; John Hays Hammond, Howard N. Eavenson, E. E. Slosson, Arthur D. Little, A. C. Fieldner and Dr. H. C. Parmelee, United States.

SCIENTIFIC NOTES AND NEWS

DR. ARTHUR D. LITTLE, president of Arthur D. Little, Inc., and of the Petroleum Chemical Corporation, was elected president of the Society of Chemical Industry at the recent New York meeting. The meeting of the society in 1929 will be in Manchester, England.

THE government of France has conferred upon Dr. L. O. Howard, of the Bureau of Entomology, the rank of officier de la Légion d'Honneur, as a promotion from the rank of chevalier of the legion. Dr. Howard has recently received honors from Hungary, having been made honorary member of the Hungarian Royal Society of Natural Sciences and of the Entomological Society of Hungary.

DR. CLEMENS PIRQUET, specialist in the diseases of children, was on August 29 nominated for the presidency of Austria, to succeed President Michael Hainisch, whose term expires at the end of November. Dr. Richard Wettstein, professor of systematic botany in the University of Vienna, was the only other candidate.

THE British National Institute of Agricultural Botany has awarded the Snell memorial medal for 1927 to Professor Paul A. Murphy. The medal is given annually to mark eminent work in the sphere of potato husbandry.

DR. K. K. CHEN, associate in pharmacology of the Johns Hopkins University, has been awarded a prize of \$2,000 Mex. for his researches on ephedrine and other Chinese drugs by the China Foundation for the Promotion of Education and Culture.¹ During the recent Congress of the International Anesthesia Research Society in Madison and Minneapolis, Dr. Chen's name, together with that of Professor Walter J. Meek, was listed in the Scroll of Recognition for their "laboratory studies leading to the clinical use of ephedrine in occidental medicine, surgery and anesthesia."

¹ For the organization of this foundation, see E. V. Cowdry, *SCIENCE*, 1927, LXV, 150.

DR. CLIFFORD S. LEONARD has resigned as assistant director in the department of pharmacology and toxicology in the Yale School of Medicine, to become director of the Burroughs Wellcome Experimental Research Laboratories, Tuckahoe, New York, now in process of organization. Pure and applied research on medical and pharmaceutical lines will be conducted.

DR. J. S. DE LURY, professor of geology in the University of Saskatchewan, has resigned his position there to return to Winnipeg in the dual capacity of commissioner of mines for the Province of Manitoba and head of the department of geology in the University of Manitoba.

AFTER a year in Germany working under Professor J. Franck and later under Professor A. Sommerfeld, Dr. A. C. G. Mitchell has become a fellow at the Barthol Research Foundation of the Franklin Institute.

DR. PAUL R. RIDER, associate professor of mathematics in Washington University, has been given a year's leave of absence to enable him to accept a Sterling Research Fellowship in mathematics at Yale University.

ANDREY A. POTTER, dean of engineering of Purdue University, and Arthur N. Johnson, dean of engineering of the University of Maryland, have been designated as members of the land-grant college survey staff of the U. S. Bureau of Education.

PROFESSOR NELSON C. BROWN, of the College of Forestry of Syracuse University, has been named a member of the New York State Reforestation Commission. Investigation of the possibilities of reforestation of New York State and the preparation of a survey of the location, value and area of all land available for reforestation constitute the purpose of the commission.

DR. A. E. KENNELLY, professor of electrical engineering at Harvard University, and Professor F. L. Stevens, professor of plant pathology in the University of Illinois, represented the American Association at the recent Glasgow meeting of the British Association for the Advancement of Science. Mr. Watson Davis represented Science Service.

DR. FRANKLIN H. MARTIN, president-elect of the American College of Surgeons, has returned to Chicago from a visit to the Canal Zone in the interest of the Gorgas Memorial Institute, for which at the last session of the Congress an annual appropriation of \$50,000 for the next five years was made.

DR. W. D. MATTHEW, chairman of the department of paleontology of the University of California, has

returned to Berkeley from a summer spent on study at the American Museum of Natural History in New York, where he is completing an illustrated reference book on the prehistoric animals of the paleogene epoch which he started thirty-one years ago.

DR. J. M. D. OLMSTED, professor of physiology and chairman of the department at the University of California, has returned to Berkeley after having spent the summer in Belgium and England. He spent six weeks at the Physiological Institute of Liège, Belgium, where he delivered two lectures on the history of insulin.

A NUMBER of visiting scientific men will work in the research department of biochemistry of the University of California during the coming academic year. These include Dr. Werner Schmidt, one of the seven men sent from Germany to America each year by the International Educational Board; Professor W. M. Hoskins, associate professor of chemistry at the University of Nevada; C. V. Smythe, who for the past two years has been connected with the Institute for Animal Nutrition at Pennsylvania State College, and O. H. Emerson, from Hawaii, who has been awarded a university fellowship in biochemistry to work under Dr. L. R. Cerecedo.

DR. A. S. HITCHCOCK, principal botanist in charge of systematic agrostology in the Bureau of Plant Industry, has returned to Washington from Newfoundland and Labrador, where he spent the summer in collecting and studying grasses.

MRS. MARY L. JOBE AKELEY, widow of the African explorer, has sailed for Europe. She will go to Brussels to collaborate with Dr. Jean M. Derscheid, zoologist of the Congo Museum of Turvueren, in the preparation of a final report on the Akeley-Derscheid mission to the Parc National Albert in the Belgian Congo.

THE schooner *Bowdoin*, bearing the party of scientific men and explorers headed by Commander Donald B. MacMillan, arrived at Wiscasset, Maine, on September 8, after a year in Labrador.

PROFESSOR THOMAS J. BARR, head of the department of mining engineering at the University of Kentucky and formerly connected with the Chicago and Alton Railroad Company, died at Lexington, Kentucky, on August 31, at the age of forty-eight years.

FERNAND DUCRETET, Carnegie medalist and a member of the French Legion of Honor, who since 1893 has been engaged in radiography and who assisted in the research work of Branly Arsonval and General Ferrie, died on September 4, as a result of continuous work with X-rays.

THE United States Civil Service Commission states that the position of principal horticulturist of the Bureau of Plant Industry, at a salary of \$5,600, is vacant and that applications should be received before October 1. Instead of the usual form of civil-service examination, the qualifications of candidates will be passed upon by a special board of examiners composed of Dr. A. F. Woods, director of scientific work, U. S. Department of Agriculture; Dr. E. J. Kraus, professor of botany, University of Chicago, and Frederick W. Brown, assistant chief of the examining division of the United States Civil Service Commission. Applications must be on file not later than October 3 for the position of principal agronomist. This examination is to fill a vacancy in the Bureau of Plant Industry at Albany, Georgia, and vacancies occurring in positions requiring similar qualifications in Washington, D. C., or elsewhere. The entrance salary is between \$5,600 and \$6,400 a year. The duties of the position are to plan and conduct research on cotton production, independently or in consultation with other workers in the department.

THE fifty-seventh annual meeting of the American Public Health Association will be held in Chicago from October 15 to 19, under the presidency of Dr. Herman H. Bundesen, with headquarters at the Stevens Hotel. There will be forty-two sessions, thirty-one of which will be meetings of sections of the association. Dr. Bundesen will deliver the presidential address at the first general session. Meeting jointly with the American Public Health Association will be two other national organizations—the American Child Health Association and the American Social Science Association.

THE Mexican Agrolological Society was organized at a meeting in Meoqui, Mexico, on July 12, with W. E. Packard, *president*; C. F. Shaw, *honorary vice-president*, and A. Brambila, *secretary*. These officers, with Dr. L. Fourton, M. Y. Solorzano and A. E. Koher, form the executive committee. The purpose of the society is to promote research in soils, agronomy and related fields, to maintain closer contacts between the various research workers and to give them an opportunity for exchange of views and discussion at the annual meetings. The headquarters will be in Mexico City, the office of the president being in Casa del Lago, Chapultepec, D. F., Mexico.

A GIFT of \$100,000 for the purchase of a gram of radium and accessories for use in the treatment of cancer has been received from Colonel Louis J. Kolb by the Graduate Hospital of the University of Pennsylvania and the department of radiology of the University's Graduate School of Medicine.

THE Chicago Geographical Society expedition to the Mountains of the Moon in Equatorial Africa planted the American, British and Explorer's Club flag on the summit of Mount Baker on August 26. The party, under Carveth Wells, ascended the mountain from Mobuku Valley. After crossing the mountain they descended into Bujuku Valley. The climb and descent was attended by great hardship, the party having to contend with snowstorms practically all the way. They overcame all difficulties, however, and report that all is well.

THE members of the Oxford University Expedition to Greenland, which had for its object the continuation of the biological work begun in the Oxford Arctic Expeditions of 1921, 1923 and 1924, arrived at Stornoway on August 1 on the completion of their work.

THE Medical Research Council announces that on behalf of the Rockefeller Foundation it has awarded five fellowships provided by the foundation and tenable in the United States of America during the academic year 1928-29. The recipients are Mr. L. E. Bayliss, Ph.D. Cantab., Sharpey scholar, University College, London; Dr. A. V. Neale, resident medical officer, Children's Hospital, Birmingham; Mr. F. J. Worsley Roughton, Ph.D. Cantab., lecturer in physico-chemical aspects of physiology, University of Cambridge; Dr. Dorothy S. Russell, research worker in the Baron Institute of Pathology, London Hospital, and Mr. A. Wormall, M.Sc. Leeds, lecturer in biochemistry, University of Leeds.

THE trustees of the Beit fellowships for scientific research have made the following elections to fellowships tenable at the Imperial College of Science and Technology, for two years 1928-29 and 1929-30, of the value of £250 per annum: Dr. R. H. Purcell, subject of research—"Change of properties of pure substances on intensive drying; problems in catalysis with special reference to the unique influence of water." Mr. A. A. Fitch, subject of research—"(*a*) The metamorphic aureole of the Dartmoor granite; (*b*) Investigation of a part of the Central Weald." Mr. J. M. Frankland, subject of research—"Effect of constitution and treatment on the mechanical properties of steel." Dr. Purcell having declined the award owing to his acceptance of a Ramsay Memorial Fellowship, the Beit trustees have awarded the vacant fellowship to Mr. E. C. S. Megaw, of Belfast, for research under Professor Fortescue on "Properties and behavior of the thermionic valve."

THE following have been appointed by the Bureau of Plant Industry as agents in connection with the agronomic corn-borer research program of the bureau's office of cereal crops and diseases: John S.

Cutler, Wooster and Bono, Ohio; Joseph F. Haskins, Wooster and Bono; Louis R. Jorgenson, Columbus; Robert W. Jugenheimer, Ames, Iowa; T. A. Kiesselbach, Lincoln, Nebr.; Vincent H. Morris, Wooster and Bono; Marion T. Meyers, Columbus; Jasper D. Sayre, Wooster and Bono, and L. J. Stadler, Columbia, Mo. Most of the Ohio experiments are conducted under conditions of heavy infestation at the Ohio Corn-Borer Experiment Station at Bono, in cooperation with the Bureau of Entomology of this department, the Ohio Agricultural Experiment Station and Ohio State University. Certain phases of the experiments also will be carried on at Wooster and Columbus, Ohio, and on some of the outlying experimental farms. The program includes corn-breeding experiments, experiments on rate and date of planting different varieties, and on cultural methods as affecting the rate of development and yield of corn, and intensive investigation of the physiology and biochemistry of the corn plant—all in relation to infestation and damage by the European corn borer. In addition to the experiments in Ohio, cooperative experiments on the effect of rate, date and manner of planting different varieties of corn upon the plant life history and development, and upon yield and quality, have been undertaken in cooperation with the agricultural experiment stations of Iowa, Kansas, Missouri and Nebraska.

The Experiment Station Record reports that following the conference of American States, held in Havana on January 16 to February 20, a new division of agricultural cooperation has been established in the Pan-American Union. The function of this division will be to advance cooperation and research in agriculture, animal husbandry and forestry in the member countries of the Union. A study will be made of the organizations for agricultural advancement which are maintained by the various countries, including the projects of departments of agriculture, agricultural experiment stations, educational institutions, scientific and agricultural publications and leaders in agricultural industry. Steps will also be taken to promote the exchange of seeds and plants and the organization of surveys of soils, forests, vegetable crops and related problems and to conduct an information service or clearing house. Technical cooperating committees are to be organized in the several countries to formulate programs for conferences on inter-American agricultural cooperation and problems of plant and animal sanitary control. Alberto Adriani, of Venezuela, will be in immediate charge of the new division, with Dr. W. A. Orton, scientific director and general manager of the Tropical Plant Research Foundation, as technical adviser.

THE *Journal* of the American Medical Association states that in the report of the recent meeting of the building committee of the "University City," the secretary, Don Florestan Aguilar, announced that the bull fight held lately in Madrid for the benefit of the "University City" had cleared 47,500 pesetas. He announced, also, that it had been agreed to include the veterinary school among the buildings of the city. It was agreed that a committee composed of a professor of the veterinary school and an architect should visit the veterinary schools of Leipzig and Munich to collect fundamental principles to be used in the school of Madrid. Those German veterinary schools are considered by the committee to be the best in the world. Señor Aguilar presented the plans for a dormitory in the "University City" for the Spanish-American students. The funds for the building are the gift of Dr. Del Amo. The project is entrusted to Señor Nebot, director of the School of Architecture of Barcelona. It was agreed that the work should begin immediately. Dr. Del Amo D. Gerardo is a physician, formerly of Madrid, who emigrated to Los Angeles. It is estimated that the cost of the work will be 130 million pesetas. The mayor of Madrid ordered that the municipal hospital, which is to be built with three million pesetas left by the Count of Guaqui for this purpose, should be constructed on the land of the "University City" and in connection with the hospital of the medical faculty.

PROTECTING the sea front along the Scripps Institution of Oceanography, University of California, assembly bill 368 has been passed by both houses of the legislature and signed by Governor Young. This bill creates a biological reserve along the shore line of the institution, and prevents all fishing and collection of marine life to a mean low tide depth of six feet, which includes outlying rocky ledges. This action was taken because of the threatened extinction of many kinds of marine animals in these waters.

UNIVERSITY AND EDUCATIONAL NOTES

A GIFT of \$2,000,000 has been made by Mr. John D. Rockefeller, Jr., toward a building for American students in the "University City" at Paris.

THE first unit in the two and a half million building program at the University of Tennessee is now in process of erection. The building is for physics and geology, and, with its furnishings, will cost about \$200,000. Plans for a building for chemistry are

under way, and other buildings projected include a program calling for about \$500,000 annually for the next five years.

THE new building for animal biology at the University Farm of the University of California at Davis, built at a cost of \$300,000, is nearing completion. It is planned to occupy the building on October 1.

REAR ADMIRAL SAMUEL S. ROBINSON has assumed his new work as the superintendent of the United States Naval Academy at Annapolis, succeeding Rear Admiral Louis Nulton.

PROFESSOR ELMER S. SAVAGE has been named acting head of the department of animal husbandry at Cornell University, succeeding Professor Henry H. Wing, who retired at the close of the academic year.

ACCORDING to the *Journal* of the American Medical Association, Dr. James E. Rush, head of the department and professor of hygiene and public health, University of Kentucky, Lexington, has resigned. Drs. W. Walter Zwick and D. Stanton Ross are also reported to have resigned from the department of hygiene.

DR. ROBERT DONALDSON has been appointed to the Sir William Dunn chair of pathology in the University of London, tenable at Guy's Hospital Medical School.

DAVID REGINALD PIPER MURRAY, of Pembroke College, Cambridge, has been elected to the Benn W. Levy research studentship in biochemistry.

DISCUSSION

THE EARLIEST DYNAMO

I NOTICE that in the issue of *SCIENCE* of August 13, 1928, Dr. Frederick Bedell, of Cornell University, in alluding to the letter of Dr. H. W. Wiley in your issue of May 25, 1928, says that he quite correctly calls attention to the fact that the fiftieth anniversary of the dynamo should have been held some time ago, and alludes to two French dynamos exhibited at the Centennial Exhibition of 1876. He then goes on to say, "The earliest dynamo made in America, constructed before the importation of any machines from Europe, was operated and exhibited at the same exhibition." He describes the conditions.

Now I am not aware that anybody has ever claimed that the fiftieth anniversary of the dynamo was to be celebrated. At the Franklin Institute meeting of April 18, I took part with others in a celebration, but it had nothing to do with any fiftieth anniversary

of the dynamo. What it really was was the fiftieth anniversary of the pioneer investigations on dynamo machines. It is difficult for me to conceive how this celebration could have been imagined to be a celebration of the fiftieth anniversary of the dynamo itself as a machine. There is evidently a profound misconception somewhere, for which I have myself absolutely disclaimed any responsibility.

A dynamo is a machine for converting mechanical energy into electrical energy. Its prototype was, of course, the Faraday disc experiment, followed by such machines as the Pixii, Saxton, Allen (modified later by Lontin), Niaudet and others. The Faraday experiments were made in 1831; Pixii made his machine about 1832; the Clark machine was made in 1834; the Stohrer machine was made after the Pixii, in 1844. However, they were called magneto-electric machines, but there is no essential distinction between such machines and a dynamo electric machine.

After the Abbé Nollet, the alliance machines were made for producing electric arc light. Knight made, in 1854, the first dynamo of the inductor type, so far as can be ascertained. The Siemens shuttle armature, made by Werner Siemens in 1856, was used in a number of types of commutating dynamos. The Holmes machine, an alternating machine like the Alliance, came in 1857. The Paccinotti, the basis of the Gramme construction of 1870, came out in 1860, and the shuttle armature of Siemens appeared in the Wilde-Ladd, Wheatstone and Varley machines of about 1866-1867.

If the question is supposed to concern the time when the first dynamo in America was made, which, after all, does not seem to be a very important matter, it can be said that Davis's "Manual of Magnetism," the edition of 1842, shows magneto-electric machines of the Saxton and Pixii type as on sale in America. Wilde-Ladd machines using a Siemens shuttle were to be found in collections of electrical apparatus, and modifications of such machines were used by Moses G. Farmer in furnishing the current for exploding charges of powder in blasting and the like by melting a fuse wire by current.

This is a mere skeleton of the case, but shows that there is no such possibility of claiming the earliest dynamo made in America as defined by some particular type. It is unfortunate that the discussion ever arose from a misunderstanding which I have pointed out as to the nature of the fiftieth anniversary held at the Franklin Institute last April.

The *Journal* of the Franklin Institute for July, 1928, Volume XX, No. 1, may be referred to as showing the real nature of the anniversary celebration which was actually held, and which had nothing to do,

as stated before, with the earliest dynamo in America. I hope that this statement will clear up the matter.

ELIHU THOMSON

EARLY GRAMME MACHINES

THE number of Gramme machines exhibited at the Centennial Exposition in Philadelphia in 1876 is increasing almost as rapidly as the men in Buckram.

There was a slight error in the notice in *SCIENCE* for April 13 which indicated that the celebration held in the Franklin Institute was in honor of the invention of the dynamo. In point of fact, it was the fiftieth anniversary of the first scientific test of the dynamo ever made in this country. Some of the scientists who attended this fiftieth anniversary took an active part in the testing of dynamos fifty years before. This is particularly true of Dr. Elihu Thomson and Dr. E. J. Huston.

On June 5, 1928, I received a letter from Professor A. P. Carman, of the University of Illinois, from which I quote the following:

I went to Purdue as Professor of Physics and Electrical Engineering in 1889, and was much interested in finding that Gramme machine as part of the equipment. My students worked with it for three years while I was at Purdue. My interest in the machine was increased by the fact that we had at Princeton the exact mate of this machine. The Princeton machine was purchased by Professor C. F. Brackett at the Philadelphia Centennial Exposition, and I had heard from Professor Brackett that it was one of the two duplicates which were at the Exposition. I do not think that Professor Brackett knew where the second machine went. I had worked as a student with the Princeton Gramme machine.

I had never heard of the machine which you say was purchased by Professor Barker of the University of Pennsylvania, but there was a similar machine at Cornell University which Professor Anthony had made after the model of the historical Gramme machines which are now at Purdue and at Princeton.

Professor Carman has surely thrown a monkey-wrench into the machinery. In addition to this, he has cited another Gramme machine of which I have had no knowledge.

On June 7, I received an illuminating letter from Dr. Elihu Thomson. He says:

The celebration held at the Franklin Institute was really limited to the fiftieth anniversary of the first comprehensive tests made on dynamos, in which as many machines as could be gathered together at the time were put through not only photometric and mechanical tests, but the electrical tests. This had not been done before, so far as I am aware, and the results were of considerable value. The very Gramme machine which you purchased for the Purdue University, and which was the one at

the Centennial Exhibition of 1876 was borrowed from the Purdue University for the Franklin Institute tests, and figures prominently and very honorably in that series of tests

Dr. Charles E. Munroe, son-in-law of Professor Barker, of the University of Pennsylvania, suggested to me that I might find some reliable information respecting the Gramme machine at the University of Pennsylvania by addressing Professor Arthur W. Goodspeed, professor of physics at that institution. I have a very interesting letter from Professor Goodspeed on this point. I quote as follows:

I think that you are correct in your impression that Barker bought the Gramme machine that was exhibited at the Centennial. We have one here now which I was told in 1884 when I first came to the University, by Professor Barker, that it was the first machine ever imported into this country, and I have exhibited it as such for 44 years. I referred to the matter at the recent 50th anniversary of the Thomson and Houston Tests that were made at the Franklin Institute, and Elihu Thomson had the same recollection as I have.

It might be well to address a note to Professor Magie of Princeton who has been there for many years, probably before Brackett's death and he may be able to shed some light on the question.

Following the suggestion of Professor Goodspeed, I wrote Professor Magie, at Princeton, for his view of the case. He says:

We have a Gramme machine in the museum of the Palmer Physical Laboratory which Prof. Brackett used to tell me was one of the two exhibited at the Centennial Exposition in Philadelphia. It was bought by him at the close of the Exposition.

An account of the machine signed by me is attached to it. It contains statements which I am sure I did not invent and which I could have heard only from Professor Brackett. These statements, however, have not remained in my memory except the last one relating to the purchase of the machine. The inscription is as follows:

"This machine represents the first type of a commercially successful direct current generator. It was developed by Gramme in 1873. It was imported into the United States in 1875 or early in 1876 with a second machine of the same design. The two machines were exhibited at the Centennial Exhibition in Philadelphia during 1876, one being operated as a generator and the other as a motor. This was the first public demonstration in this country of the transmission and utilization of electric power. The machine was purchased by Dr. C. F. Brackett for the University soon after the close of the Exhibition."

As they say in "The Mikado," "Here's a pretty kettle of fish." Apparently, there must have been three Gramme machines at the Centennial Exposition. I

spent over two months in Philadelphia and visited the exposition practically every day it was open during my stay. I was so infatuated with the electrical exhibit that I feel quite certain I went to look at it every day I was at the exposition. My memory is very clear in regard to the number of machines. There were only two. A large and a small one. When I bought the small one for Purdue I was told by some one, I can not give the authority now, that Dr. Barker had bought the large one for the University of Pennsylvania. It has been fifty-two years now, and during all this time I have held firmly to this belief. It is barely possible that another machine was in storage and that probably was sold to Professor Brackett.

Seven cities claim great Homer dead

Through which the living Homer begged his bread.

Presumably, the only one of the Gramme machines which has a clear title to immortality is the one purchased for Purdue University.

In a more recent letter received from Dr. Elihu Thomson, a solution of the riddle is made. Dr. Thomson says, under date of July 11:

I think there was another Gramme dynamo in the possession of Dr. Barker, of the University of Pennsylvania. I think Dr. Barker imported this Gramme dynamo ahead of the Centennial Exhibition. I have a recollection of having seen him use it before that Exhibition on the stage of the Academy of Music in Philadelphia, while he was delivering a public lecture.

After all, perhaps Dr. Barker did import his Gramme machine prior to the Centennial Exposition. It would be interesting to search the financial records of the university for 1875 and early 1876 to see if any notice of such purchase could be found. If so, peace would be restored.

A further contribution of early electric arc lights may not be out of the way here. In 1870 I taught physics and chemistry in the Indianapolis high school. I had prevailed upon the trustees to purchase what was thought in those days a large invoice of apparatus and supplies for a series of illustrated lectures on physics and chemistry. Among other apparatus was an electric battery of twenty-four Bunsen cells. With this outfit was also a lamp with carbon electrodes. With this apparatus I produced an electric light which caused a somewhat vivid publicity. In my scrap-book I have preserved an interesting published interview with a reporter who came to see this marvelous light at the high school. I hardly need say that I did not see his report until it was published. It was as follows:

Further information may be obtained by anyone who will take the trouble to visit the high school where Professor Wiley performs experiments for the benefit of his pupils. The galvanic battery was manufactured by Bunsen and contains twenty-four large cells. The experiments with these instruments were highly satisfactory, the light being only two or three per cent. less than that of the sun. The gas flame paled to a vapor and the air was filled with flickering waves like those we see in summer when the atmosphere is at white heat. The light itself is a white flame as trying to the eye as the sun. The hue given to surrounding objects is sickly in comparison with the light of day.

The reporter, after all, has given a vivid description of this characteristic phenomenon.

In the *American Journal of Science and Arts*, July, 1879, I published a paper relating to the exhibitions of electric light at Purdue University. I had constructed a special lamp to be used for this purpose. In order to increase the conductivity of the carbons I plated them with copper. I made various other adjudications in regard to the lamp in order to make it more effective and to utilize the carbons more economically. On the publication of this paper I received a letter from Dr. Charles J. Brush informing me that he had taken out a patent on copper-coated electrodes and warning me that if I wished to use them at all I should have to pay a royalty to his company. This was the first intimation that I had that the process which I also invented was covered by letters patent. I wrote to Dr. Brush that I had no expectation nor desire to offer my invention for commercial purposes, and that I should certainly not do so anyway in view of the fact that he had already patented the process. My invention was largely, however, the improvement which I introduced into the copper-coated electrode. This was my first introduction to Dr. Brush, whose wonderfully successful career in electric lighting and in other allied branches of science has reflected such credit upon himself and has facilitated such valuable improvements in all branches of the technical science connected with electric illumination.

H. W. WILEY

WASHINGTON, D. C.

THE PROPOSED NATIONAL PARK IN THE MAMMOTH CAVE REGION AND THE KENTUCKY GEOLOGICAL SURVEY

THE creation of a national park in the Mammoth Cave region has been pending for several years. Regarding the progress of the movement the director of the Kentucky Geological Survey, W. R. Jillson, writes:

... Over a million dollars have now been raised and subscribed for the purchase of this park, and I am

assured by Governor Sampson who is chairman of the organization raising the funds, that there will be no difficulty in securing the entire amount. In other words, Kentucky will do its part and the Mammoth Cave region will become a national park in due course.

It is perhaps premature to congratulate Kentucky on this achievement. But it seems worthwhile to point out the change in sentiment which this large amount of public subscription reflects. Five years ago I made my first visit to the cave area. At that time the subject of a national park was greeted on all sides with annoyance and resentment—even with counter propaganda on governmental invasion of private rights. I soon learned that it was necessary to avoid the subject to save argument. This spring the attitude was patently different. The native residents seem to be ready for the change; many of the employees connected with the cave properties are not averse to the plan; some even have contributed to the public funds.

How much the efforts of the Kentucky Geological Survey and its publications have had to do with this change in sentiment is difficult to evaluate. It seems to me that it may be more than coincidence that during the past five years there have been published the volume on the geology of Edmonson County, in which Mammoth Cave is located, a booklet on Kentucky State Parks, besides the survey and publication by cooperation with the U. S. Geological Survey of several topographic quadrangles in that vicinity. I noted in one hotel the state geologic map displayed in the main lobby. The state seems to be conscious of its geologic survey! In anticipation of the growing interest in the cave area an illustrated guide by A. K. Lobeck is shortly to be published.

In its molding of public sentiment by the dissemination of information the Kentucky survey appears to have made an achievement.

A. C. SWINNERTON

ANTIOCH COLLEGE

QUOTATIONS

CHEMISTRY IN INDUSTRY

SIXTEEN years ago the Society of Chemical Industry last met in America. Those who recall that meeting remember the spirited controversy between Sir William Perkin and Duisberg over synthetic rubber. No one then dreamed what was impending and what enormous demands the nations would soon make upon applied chemistry. As President Francis H. Carr said in the annual address, the great advance which has occurred is due in part to the fact that whole nations have made united effort to achieve a com-

monly accepted purpose. This is a beneficent by-product of the war.

Of this general result, English experience furnishes specific illustration. From the time when the Prince Consort, in the middle of the last century, imported a German chemist to the Royal College of Chemistry in London (one of whose pupils was this same William H. Perkin, who discovered the first synthetic dye and who, as Sir William Perkin, confronted Professor Duisberg with the evidence of an earlier synthetic process for making rubber), the English government gradually increased its efforts in behalf of science. But it was not until after the war had begun, in 1915, that it made direct financial provision for researches "undertaken with definite utilitarian objects." Out of this came the Department of Scientific and Industrial Research, which maintains a number of stations of its own, but which functions chiefly through associations. In them different firms unite to maintain additional stations, the government making grants in aid.

This procedure has tended to help companies that could not support independent laboratories and has had the wholesome effect of diminishing trade secrecy through the exchange of experience. Chemical "invention" is so different from mechanical invention that it is difficult to give sufficient encouragement through patents without preventing to some extent the general cooperation which these associations seek. Many chemical patents, and this is true not alone in England, hold the key to subsequent discoveries and may be of little value unless those discoveries are made. They tend thus to block the way to other workers. To maintain such a balance as will encourage research effort and yet not discourage further and intensive effort will require serious international consideration and cooperation, and this society should be most helpful in establishing that delicate balance.

It is stated that chemists have added twenty billion dollars to the world's wealth. This is probably not an exaggeration if credit for this vast increase is shared with the industries that have translated to human uses the chemist's formulae. The race would face tomorrow with considerable anxiety if the chemist had come not "to replace Nature's syntheses," but to supplement them. His mind is, after all, the most potent catalyst.—*The New York Times*.

SCIENTIFIC BOOKS

Le Plateau Central de la France et sa bordure méditerranée. Etude morphologique. By HENRI BAULIG. Armand Colin, Paris, 1928. 591 pages, 33 half-tone views, with 11 folded sheets in pocket; 4 of river profiles, one of geological sections, and 6

of contoured maps, 1:200,000, with volcanic areas, oligocene deposits and chief river names in red, but no names for small streams or towns.

HENRI BAULIG, lecturer in geography at the University of Strasbourg, has produced a studious treatise on the Central Plateau of France, which, in giving a keen and thorough morphogenetic discussion of that interesting region, presents a minute analysis of its geological history and an argumentative demonstration of its progressive development rather than a direct description of its visible forms, such as might be expected from a geography teacher. The introduction explains that the great Hercynian revolution of central Europe was followed by a long period of exceptional stability, when the Hercynian mountains were worn down to a post-Hercynian plain, which in this region extended across large areas of massive and resistant crystalline rocks and several narrowly compressed synclines of stratified rocks, and which in the completeness of its degradation has had no later parallel in Europe. The plain was depressed, invaded by the sea and buried under Mesozoic strata until an early Tertiary upheaval with moderate deformation caused emergence and introduced a second period of erosion, when the crystalline rocks of the central area were again laid bare and worn down, but at a lower level and over a smaller area than before, to an Eocene peneplain or plain of degradation, while the gently slanting Mesozoic strata surviving in the marginal area, where the post-Hercynian plain is still buried, were evenly beveled across. In mid-Tertiary time the Eocene plain was fractured into innumerable blocks and the blocks were diversely displaced, some being moderately upheaved, while others were depressed. Many volcanic eruptions then took place, especially on the uplifted areas, while the more deeply depressed blocks became the seat of fluvial and lacustrine deposition. It is by the later erosion of this much jostled region, to which a broad upheaval of late date appears to have contributed, that the present topography is developed; the uplifted blocks of resistant crystallines being only narrowly dissected, while the basins of lacustrine deposition—the Limagnes—have been broadly reduced to plains at grade with their rivers. The valleys then excavated show, as was first pointed out by Briquet, the effects of four or more successive revivals of erosion at decreasing intervals, so that in rocks of similar resistance the younger and deeper-cut valleys are nested in the higher and earlier-cut valleys, the most mature forms being preserved in the headwaters of the first excavated, and the younger forms being found in the lower courses of the latest excavated valleys. In illustration of this relation Baulig has constructed with painstaking industry numerous river profiles, in which

the steepening of each in-nested valley-head beneath the less steep floor of the next upstream valley is repeatedly and consistently shown.

The existing features of the Limousin or westernmost and simplest division of the region, where the Eocene plain on the crystallines is little dislocated by fractures and is wholly free from volcanic additions, receive the best description. The surface is almost ideally plain over certain areas; elsewhere it is either surmounted by heavy-bodied residual mounts or trenched by later-carved valleys. Where the beveled marginal covering strata are weak, they are in some localities worn away so as to reveal in their foundation a part of the ancient, post-Hercynian plain, which makes a small angle with the Eocene plain of the central area. The Eocene plain slopes with the fall of the old rivers that drained it, and the rivers are therefore classed as "consequent"; but in a sense quite unlike that originally given to the term by Powell. The eastern and southern divisions of the region are so elaborately fractured that their description, not illuminated by simplified diagrams, is obscured in a multitude of technical details which a foreign reader must find difficult to apprehend. Indeed, nearly the whole volume is arduous reading, because of the frequent mention of local features—Coiron, Forez, Margeride—as if they were universally known, as well as because of repeated and unexplained references to geological formation—Lutetienne, Sannoisienne, Stampienne—and to names of insignificant towns—Cusset, Charray, Panouval—and streams—Truyère, Sumène, Alagnon—for which no location is intimated in general terms. One must regret that so competent a study of so interesting and instructive a region is not presented in a form more easily understood by others than French specialists.

W. M. DAVIS

SPECIAL ARTICLES

THE EFFECT OF COD LIVER OIL ON THE DELAYED COAGULATION TIME FOLLOWING EXPERIMENTAL OBSTRUCTIVE JAUNDICE

BLOOD coagulation is delayed in both clinical and experimental obstructive jaundice. The cause of this delay has been studied by many investigators. King and Stewart¹ observed a delayed blood coagulation *in vitro* when bile pigments were added to the blood. They interpreted this delayed blood coagulation of jaundiced animals as due to insufficient available calcium. Further evidence for the existence of a func-

tional calcium deficiency is found in the work of Lee and Vincent², Walters and Bowler³, Kirk and King⁴.

Calcium chloride and parathyroid extract have been reported to be of value in the preparation of jaundiced patients for operation and also of value in controlling hemorrhages from various causes.^{5, 6, 7, 8} In some previous work the author reported favorable results in the treatment of symptoms of thyro-parathyroidectomized dogs by using cod liver oil in addition to a mixed diet (1928a) and also cod liver oil and yeast (1928b).⁹ It would seem that if cod liver oil is of value in this calcium disturbed condition, it might be of value in mobilizing calcium in obstructive jaundice and consequently in reducing the coagulation time. Before this work was completed, an article appeared by Liu¹⁰ in which he showed that cod liver oil increased both fractions of the serum calcium, the diffusible and the non-diffusible. The former increased more than the latter. This adds to the rationality of using cod liver to hasten blood coagulation in jaundiced animals in which diffusible or available calcium is low.

Blood was drawn from the external saphenous vein or heart of dogs, and the coagulation time was determined by the method of Lee and White.¹¹ It was found that more accurate and consistent results could be obtained by using ten mm tubes instead of eight mm, as used by Lee and White. The tubes and syringe were washed with soap and water and rinsed with normal saline. To insure accuracy, four tubes, each containing 1 cc of blood, were used and the average coagulation time of the four determined. The calcium estimations were made by the Kramer and Tisdall method, modified by Collip and Clark.¹²

After having determined the normal coagulation time, the common bile duct was doubly ligated and

² Lee, R. I., and Vincent, B., *Arch. Int. Med.*, xvi, 59-66, 1915.

³ Walters, W., and Bowler, J. P., *Surg., Gynec., Obst.*, 39: 200, 1924.

⁴ Kirk, P. L., and King, C. G., *J. Lab. and Clin. Med.*, 11: 921, 1926.

⁵ Walters, W., *Surg., Gynec., Obst.*, 33: 651, 1921.

⁶ Grove, W. R., and Vines, H. W. C., *Brit. Med. J.*, 791, 1922.

⁷ Cantarow, A., Craven, W. R., and Gordon, B., *Arch. Int. Med.*, 38: 502-509, 1926.

⁸ Gordon, B., and Cantarow, A., *J. A. M. A.*, 88: 1301-1302, 1927.

⁹ Brougher, J. C., *Am. Journ. Physiol.*, lxxxiv, 583, 1928(a). In press (1928b).

¹⁰ Liu, S. H., *Chinese Journ. Physiol.*, i, 331, 1927.

¹¹ Lee, R. I., and White, P. D., *Am. J. Med. Sc.*, 145, 495, 1913.

¹² Clark, E. P., and Collip, J. B., *Journ. Biol. Chem.*, lxxiii, 296, 1925.

¹ King, J. H., and Stewart, H. A., *Journ. Exp. Med.*, xi, 673, 1909.

sectioned. When jaundice was pronounced, a test was made as follows: Coagulation time was observed and 30 cc of cod liver oil (Lilly) were given in 300-400 cc of water by stomach tube. Blood coagulation was determined at two, four and twenty-four hour intervals.

The normal coagulation time varied from three to five minutes in nine dogs. The length of the coagulation time following the appearance of jaundice in the animals varied in the extremes from six and one half to fourteen minutes. The degree of jaundice was judged as slight, moderate and marked, depending on the intensity of sclerae pigmentation.

There was no marked change in serum calcium following common duet ligation, but the calcium did tend to decrease as jaundice increased. After the cod liver oil was given, the coagulation time returned to normal within four hours and was practically the same after twenty-four hours. In forty-eight to seventy-two hours, it was again delayed, but not to the extent that it had previously been. Snell *et al.*¹³ observed that in some animals a spontaneous reduction in the coagulation time might occur late in the progress of the jaundice. Because this was noticed in a few animals, the tests here reported were made early after the onset of deep icterus.

While calcium and parathormone are both considered effective measures in the reduction of coagulation time in jaundice, it would seem from these results that cod liver oil might be just as effective and more practical than the others.

Repeated intravenous injections of calcium chloride or calcium lactate will produce an albuminuria and eventually nephritis. Parathyroid extract, if continued over a period of time, may deplete the bones of calcium. Cod liver oil has been shown here to consistently change a delayed coagulation time in obstructive jaundice to normal. The efficacy of cod liver oil in causing this change is probably based on its ability to increase the ionizable calcium.

In patients thus far observed having a delayed coagulation time from other causes than hemophilia, cod liver oil was efficacious in restoring normal coagulation time in four to six hours.

JOHN C. BROUGHNER

DEPARTMENT OF PHYSIOLOGY,
UNIVERSITY OF OREGON MEDICAL SCHOOL

CITRIC ACID INVERSION OF SUCROSE IN PLANT TISSUES

THE conventional method used for hydrolyzing sucrose in extracts of plant tissues has been that one using hydrochloric acid. More recently the use of in-

vertase has found favor with many analysts, and directions for its use are found in the revised methods of the A. O. A. C. For reasons pointed out in an article¹ published in *Plant Physiology*, the use of hydrochloric acid with plant extracts is often of questionable value, and our experience here and some unpublished work of the senior author have taught us that it is very hard to secure satisfactory and consistent results using invertase. For these reasons we decided to try citric acid as a hydrolyzing agent for sucrose in plant extracts. Davis and Daish² had previously reported good results using citric acid and lately Harvey³ has suggested its use with extracts from woody tissues containing a considerable quantity of glucosides. Since we could not find any results by comparing the three mentioned methods used on the same samples of plant extract, we decided to make such a study, and the brief results published below are typical of the ones we secured in this work. In the interest of brevity only a few typical examples, such as will illustrate the conclusions drawn, will be given.

The hydrochloric acid and invertase inversions were made according to the methods published in the A. O. A. C.⁴ The citric acid inversion was carried out by adding 10 per cent. of C. P. citric acid to the sample, placing in a boiling water-bath for five minutes and then allowing it to stand over night, after which the sample was treated as in the hydrochloric acid procedure. The Shaffer-Hartman method⁵ was used in estimating the reduced copper.

TABLE I
Percentage of Sucrose Present in Samples of Commercial Sucrose

Method of hydrolysis	Percentage of theoretical found
Citric acid	98.69
Hydrochloric acid	97.83
Invertase	97.05

¹ Report of committee on methods of chemical analyses, "The Determination of Soluble Carbohydrates," *Plant Physiology*, II, 195-204, 1927.

² Davis, W. A., and Daish, A. J., "A Study of the Methods of Estimating Carbohydrates, Especially in Plant Products," *J. Agr. Sci.*, 5: 437-468, 1913.

³ Harvey, E. M., "Phloridzin." *Ore. Agr. Exp. Sta. Bull.*, 215, page 23, 1925.

⁴ Association of Official Agricultural Chemists. "Official and Tentative Methods of Analysis," Second Edition, 1925.

⁵ Shaffer, P. A., and Hartman, A. F., "The Iodometric Determination of Copper and Its Use in Sugar Analysis," *J. Biol. Chem.*, 45: 365-390. 1921.

¹³ Snell, A. M., Greene, C. H., and Rowntree, L. G., *Arch. Int. Med.*, 36: 273, 1925.

In Table I, each figure represents the average of more than twenty-five determinations; in Table II a half dozen or more.

TABLE II
Analysis of Plant Extract. Results Expressed in Mgs. of
Copper Corresponding to Invert Sugar in Aliquots

Plant	Hydrochloric acid	Citric acid	Invertase
Grape:			
Stems B.....	4.58	3.21	0.79
Stems C.....	3.39	2.01	2.66
Leaves 1.....	6.34	5.68	5.22
Coleus:			
Yellow	2.16	4.96	0.24
Mixed ⁶99	2.04	-2.31

Summarizing these results the following facts seem evident. First, hydrochloric acid used with solutions containing glucosides (grape stems) gives too high results, and with those containing little and only a trace of sucrose low results. Second, invertase results are variable and the conditions for accurate use are not yet sufficiently defined to give consistent results. Third, citric acid is easy to use, consistent in results, apparently does not hydrolyze the glucosides and does not seem to destroy any of the invert sugar.

On the basis of these results it seems well worth while to thoroughly investigate the use of citric acid as an inverting agent for use with plant solutions, and it is hoped at a future date to investigate its action much more completely, especially on phloridzin and maltose.

J. E. WEBSTER
C. DALBOM

OKLAHOMA AGRICULTURAL AND
MECHANICAL COLLEGE

THE MUTANT *PARAMECIUM AURELIA*

IN February, 1924, the writer isolated from a laboratory stock culture of *Paramecium aurelia* a number of invaginated forms. Progeny of these forms were bred in pedigree isolation culture and a race of mutant paramecia was established. The distinguishing character of this mutant is an apical notch and an aboral longitudinal groove which extends almost to the posterior end of the animal. It has been found that the notch, which is sufficiently well marked as to be clearly discernible with the 16 mm objective of the compound microscope, varies slightly but is inherited equally by both daughter cells at fission.¹ As this mutant form

⁶ Many samples have only a trace or no sucrose.

¹ Dawson, J. A., 1926, "A Mutation in *Paramecium aurelia*," *Jour. Exp. Zool.*, 44, 133.

has been bred continuously in isolation pedigree cultures from February, 1924, to the present time, May 30, 1928,^{2,3} and has retained the "notched" character both in the original parent series and in ex-conjugant series derived from the parent series, the writer wishes to record the appearance of the animals at the time of discontinuance of the pedigree isolation cultures.

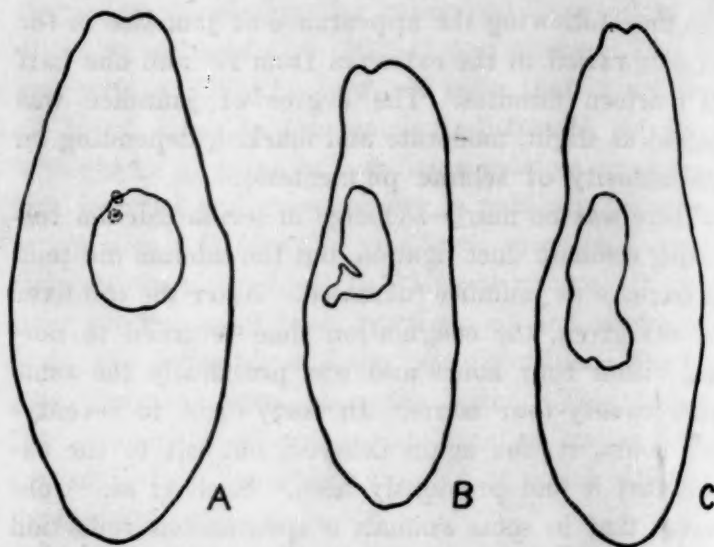


FIG. 1. Outline drawings of fixed specimens of mutant paramecia showing notched condition. X A. From Series A (original series) in 840th generation. B. From exconjugant series in 750th generation. C. From exconjugant series in 754th generation.

It is to be remarked that in all respects, except for the notch and the groove, this species shows the characters of *Paramecium aurelia* and it is not proposed to designate it other than a mutant of *Paramecium aurelia*. The micronuclei are two in number and of the characteristic "aurelia" type, as in Fig. 1, A. The three individuals shown in outline drawing (Fig. 1) made with a camera lucida from fixed and stained specimens are from the two pedigreed series of this race of paramecium. Comparison of the notched condition figured here of individuals in the 750th and 840th generations with the similar condition shown by the microphotographs in a previous report,¹ at which time the animals were in the 60th and the 300th generations, will make clear that the notched condition has been retained during the entire course of the pedigree culture. This precise inheritance of a new morphological character is, it is believed, unique in the annals of the protozoa.

J. A. DAWSON

ZOOLOGICAL LABORATORY,
HARVARD UNIVERSITY

² Richards, Oscar W., and Dawson, J. A., 1927, "The Analysis of the Division Rates of Ciliates," *Jour. Gen. Physiol.*, 10, 853.

³ Dawson, J. A., 1928, "A Comparison of the Life-cycles of Certain Ciliates," *Jour. Exp. Zool.*, 51, 199.